

# STEPPER

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to stepper, and more particularly  
5 to a stepper that includes two endless straps respectively mounted on to  
two swing arms of the stepper.

### 2. Description of Related Art

A conventional stepper in accordance with the prior art shown  
in Fig. 5 comprises a main frame (61) including a base (611) adapted to  
10 abut a supporting surface, two stands (612) respectively upwardly  
extending from two opposite sides of a front portion of the base (611)  
and a hand post (613) mounted on a free end of each of the two stands  
(612). Two swing arms (62) are pivotally mounted to a rear portion of  
the base (611). The two swing arms (62) are parallel to each other and  
15 swung opposite to each other. Each swing arm (62) has a rear end  
pivotally mounted to the rear portion of the base (611) and a front end  
having an air spring (63) mounted thereon. The air spring (63) has a  
first end pivotally connected to the front end of a corresponding one of  
the two swing arms (62) and a second end pivotally mounted to an  
20 inner side of a corresponding one of the two stands (612). Each swing  
arm (62) has an endless strap (621) movably sleeved thereon for user to  
step on the swing arms (62). A motor (64) is mounted to a rear end of  
the base (611) for driving the two endless straps (621).

The two air springs (63) are provided to respectively provide a restitution force to two swing arms (62) after being downward stepped. However, each air spring (63) only mounted to one side of each of the two swing arms (62) so that the load of each of the two swing arms (62) is not average. Furthermore, the motor (64) is mounted to the rear portion of the base (611) so that the total length of the stepper is elongated.

For solving the above problem, the motor (64) is mounted under the two swing arms (62) and each side of each of the two swing arms (62) has at least one air spring (65) mounted on each of the two swing arms (62). As a result, the stepper should have at least four air springs for balancing the load from the two swing arms (62). Consequently, the manufacturing cost is raised.

The present invention has arisen to mitigate and/or obviate the disadvantages of the conventional steppers.

### SUMMARY OF THE INVENTION

The main objective of the present invention is to provide an improved stepper that has shortened total length and a good balance.

To achieve the objective, the stepper in accordance with the present invention comprises a main frame including a base and two stands respectively upwardly extending from two opposite sides of a front portion of the base. Two swing arms are respectively pivotally mounted to a rear portion of the base. Two restitution structures are

respectively pivotally to a bottom of a corresponding one of the two swing arms for providing a restitution force to the corresponding swing arm. Each swing arm has a pivot structure mounted in a rear end of each of the two swing arms and an endless strap is sleeved thereon. A drive shaft extends through the pivot structure of each of the two swing arms for supporting the two swing arms and driving the endless strap of each of the two swing arms. Multiple supports upwardly extend from the rear portion of the base for supporting the drive shaft. A motor is mounted on the base for driving the drive shaft. A restitution structure is pivotally mounted to a bottom of each of the two swing arms. The restitution structure includes an air spring and rack. The air spring has a first end pivotally connected to the base and a second end pivotally connected to the bottom of a corresponding one of the two swing arms. The rack has a first end slidably mounted to the base and a second end pivotally connected to the bottom of the corresponding swing arm. The first end of each of the two restitution structures has two opposite sides respectively slidably received in a rectangular casing that is laterally attached to the base.

Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a perspective view of a stepper in accordance with the

present invention;

Fig. 2 is a partially exploded perspective view of the stepper in Fig. 1;

Fig. 3 is a partial top plan view in cross-section of the stepper in  
5 Fig. 1;

Fig. 4 is a side plan view of the stepper in Fig. 1;

Fig. 5 is a perspective view of a conventional stepper in accordance with the prior art; and

Fig. 6 is a perspective view of a second embodiment of the  
10 conventional stepper in Fig. 5.

#### DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and initially to Figs. 1-3, a stepper in accordance with the present invention comprises a main frame (1) including a base (11) and two stands (10) respectively upwardly  
15 extending from tow opposite sides of a front portion of the base (11). Two swing arms (12) are respectively pivotally mounted to a rear portion of the base (11) due to a pivot structure (2) mounted therein.

The base (11) has two side rods (not numbered) parallel to each other and two lateral rods (not numbered) respectively connected a  
20 front end of each of the two side rods and the middle portion of each of the two side rods. A partition (110) has two opposite ends respectively secured on the two lateral rods to equally divided the base (11) into two portions each corresponding to a corresponding one of the two swing

arms (12). The inner side of each of the two side rods and two opposite sides of the partition (110) each has a rectangular casing (112) laterally longitudinally secured on the front portion of the base (11). Each rectangular casing (112) has two opposite ends each having a cushion  
5 pad (143) therein. A support (111) upwardly extends from a rear end of each of the side rods. Each swing arm (12) has an endless strap (121) mounted around the swing arm (12) and a bottom (122) for protecting the strap (121) from being broken by the elements that is mounted under the two swing arms (12). A motor (13) is mounted on the rear  
10 portion of the base (11) to drive the two straps (121) for user to step thereon.

The pivot structure (2) includes a lining (21) securely inserted into two opposite sides of a rear end of each of the two swing arms (12) and a sleeve (22) laterally attached to a corresponding one of the two  
15 supports (111) and inserted into a corresponding one of the four linings (21). A drive shaft (3) pivotally extends through the sleeves (22) for supporting the rear end of each of the two swing arms (12). The drive shaft (3) includes an axle (32) having two opposite ends respectively secured in the two supports (111) and a cylinder (32) rotatably sleeved  
20 on the axle (32) and partially secured in the sleeves (22) of the two swing arms (12). A motor (13) is mounted on the rear portion of the base (11) for driving the cylinder (31) and the two straps (121) of the two swing arms (12).

Two restitution structures (14) are respectively mounted to two opposite sides of the front portion of the base (11) relative to the partition (110). Each restitution structure (14) provides a restitution force to a corresponding one of the two swing arms (12) after being downward stepped. Each restitution structure (14) includes an air spring (141) having a first end pivotally connected to the lateral rod relative to the rear portion of the base (11) and a second end pivotally extending to the bottom (122) of a corresponding one of the two swing arms (12), and a rack (142) having a first end pivotally connected to the front portion of the base (11) and a second end pivotally connected to the bottom (122) of the corresponding one of the swing arms (12). The first end of each of the two racks (142) has two opposite ends each having a roller (143) rotatable mounted thereon and slidably received in a corresponding one of the four rectangular casings (112).

With reference to Fig. 4, the roller (143) is moved to a front end of each of the four rectangular casings (112) and the air spring (141) is compressed when the front end of the swing arm (12) is downward stepped. The roller (143) is moved to a rear end of each of the rectangular casings (112) and the rack (142) lifts the front end of the swing arm (12) due to the restitution force of the air spring (141) when the action is removed from the swing arm (12) or smaller than the restitution force of the air spring (141). Consequently, the user can repeatedly step on the two swing arms (12) for achieving a purpose of

exercise. The two cushion pads (113) in each of the four rectangular casings (112) can absorb some of the attack from the roller (143) to prevent the stepper from a vibration.

In addition, the stepper in accordance with the present invention  
5 only needs two air springs (141) that are respectively provide a restitution force to a corresponding one of the two swing arms (12). Consequently, the stepper of the present invention can use least air springs and provide a better balance than that of the conventional steppers.

10 Although the invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.